ADAPTABILITY OF SAFFLOWER (*Carthamus tinctorius* L.) GENOTYPES TO SOME NEW ZEALAND ENVIRONMENTS

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ABSTRACT

Seven safflower (Carthamus tinctorius L.) genotypes were grown at three sites (Massey, Aorangi and Flockhouse) in the Manawatu area in years 1978 and 1979. Three additional genotypes from the world germplasm collection were included in the study in 1979. The experimental design was a randomized complete block with three replications.

The safflower genotypes were evaluated with respect to several morphological traits, and some important agronomic traits, such as yield, % oil content, % hull content and susceptibility to head rot disease. Data collected on seven safflower genotypes were analysed as a combined experiment with 3 sites and 2 years (Expt. I). The data available on 10 genotypes in 1979 were analysed separately with respect to ten important characters (Expt. II).

Of the 23 characters studied in Expt. I, the genotypic variance component (σ^2_G) was significant only for the following 6 characters: mid stem leaf length, primary head diameter, involucral bract length and length/width, bract spine index and susceptibility to head rot disease. The addition of 3 genotypes in Expt. II had a marked effect on the magnitude of σ^2_G component. Of the environmental components, site x year interaction effect was the most significant for the majority of traits.

Most of the characters studied in Expt. I showed significant genotype x environment interactions, and in most instances the second order interaction of genotype x site x year being highly significant. Adaptation analyses were performed following procedures of Finlay and Wilkinson (1963). The genotypes Leed and Dart with adaptation coefficients 1.52 and 1.75 respectively were specifically adapted to favourable environments with respect to yield. Cultivar 0-22 and Rio showed general adaptability to the same trait. For % oil content all genotypes except Rio showed general adaptability. Cultivar Rio was slightly specifically

adapted to favourable environments.

Two forms of broad sense heritabilities (full and restricted) were estimated. In Expt. I, relatively high restricted heritability estimates were obtained for the following traits: leaf length, primary head diameter, bract length and length/width, spine index and susceptibility to head rot disease. The heritability estimates obtained in Expt. II were higher than Expt. I, due to the additional genetic variability in the population. Of the additional traits studied in Expt. II, lodging and susceptibility to leaf spot disease, showed high heritability estimates.

Resistances to two fungal diseases - head rot (Botrytis cinerea Pers.) and leaf spot (Stemphylium/Alternaria species) - were assessed in field conditions. The leaf spot disease was detected only in the second year of this study. The cultivars VFSTP-1 and Partial-hull were highly susceptible to head rot disease. The two genotypes from safflower germplasm collection, PI 262437 and PI 306684 had considerable tolerance to leaf spot disease.

The optimum plot allocation study indicated that, disregarding costs, an allocation of 2 years, 4 sites and 2 replications would be more efficient than the present allocation.

There was no significant correlation between spininess and bird damage. The % oil content and % hull content were negatively correlated at both phenotypic and genotypic levels. Susceptibility to the two diseases were negatively correlated with yield. The susceptibility to head rot disease also showed a significant negative correlation with the % oil content.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES